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AEROSPACE MEDICINE AND BIOLOGY

A CONTINUING BIBLIOGRAPHY WITH INDEXES

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Typical Report Citation and Abstract

❶ **19970001126** NASA Langley Research Center, Hampton, VA USA
❷ **Water Tunnel Flow Visualization Study Through Poststall of 12 Novel Planform Shapes**
❸ Gatlin, Gregory M., NASA Langley Research Center, USA Neuhart, Dan H., Lockheed Engineering and Sciences Co., USA;
❹ Mar. 1996; 130p; In English
❺ Contract(s)/Grant(s): RTOP 505-68-70-04
❻ Report No(s): NASA-TM-4663; NAS 1.15:4663; L-17418; No Copyright; Avail: CASI; A07, Hardcopy; A02, Microfiche
❼ To determine the flow field characteristics of 12 planform geometries, a flow visualization investigation was conducted in the Langley 16- by 24-Inch Water Tunnel. Concepts studied included flat plate representations of diamond wings, twin bodies, double wings, cutout wing configurations, and serrated forebodies. The off-surface flow patterns were identified by injecting colored dyes from the model surface into the free-stream flow. These dyes generally were injected so that the localized vortical flow patterns were visualized. Photographs were obtained for angles of attack ranging from 10’ to 50’, and all investigations were conducted at a test section speed of 0.25 ft per sec. Results from the investigation indicate that the formation of strong vortices on highly swept forebodies can improve poststall lift characteristics; however, the asymmetric bursting of these vortices could produce substantial control problems. A wing cutout was found to significantly alter the position of the forebody vortex on the wing by shifting the vortex inboard. Serrated forebodies were found to effectively generate multiple vortices over the configuration. Vortices from 65’ swept forebody serrations tended to roll together, while vortices from 40’ swept serrations were more effective in generating additional lift caused by their more independent nature.
❽ Author
❾ *Water Tunnel Tests; Flow Visualization; Flow Distribution; Free Flow; Planforms; Wing Profiles; Aerodynamic Configurations*

Key

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AEROSPACE MEDICINE AND BIOLOGY

A Continuing Bibliography (Suppl. 467)

JUNE 15, 1998

51
LIFE SCIENCES (GENERAL)

19980041545 Air Force Inst. of Tech., Wright-Patterson AFB, OH USA

Georgetown Institute for Cognitive and Computational Sciences ***Annual Report, 30 Sep. 1996 - 15 Nov. 1997***

Ledley, Robert S., Air Force Inst. of Tech., USA; Dec. 1997; 151p; In English

Contract(s)/Grant(s): DAMD17-93-V-3018

Report No.(s): AD-A336792; No Copyright; Avail: CASI; A08, Hardcopy; A02, Microfiche

GICCS faculty has begun a major initiative to elucidate the complex mechanisms of higher auditory processing. Species with specialized hearing, such as bats, are used as models for complex sound processing and compared to those using cats and primates, which also use acoustic signals as a primary means of communication. Parallel research in humans using functional brain imaging and cognitive psychology examine how the human brain deals with complex sounds, particularly those relating to speech. These studies address not only normal language processing but also examine disorders of speech/language, includ ing developmental and acquired dyslexias. Understanding and modifying brain plasticity represents another major research area. Investigators use tools from cellular/molecular neurobiology and from systems neuroscience, to study plasticity after acute or chronic brain injury as well as after early vision or hearing loss. This includes development of novel pharmacological strategies to limit brain damage and to enhance cognitive function after injury or neurodegeneration. Brain magnetic resonance techniques (including functional imaging) are also used. Sophisticated computational methods are used to model sensory processing based upon experimental studies. Predictions based upon mathematical modeling are evaluated in subsequent laboratory experiments.

DTIC

Brain Damage; Magnetic Resonance; Signal Transmission; Imaging Techniques; Cognitive Psychology

19980042646

Detection of organic amines in liquid with chemically coated quartz crystal microbalance devices

Zhou, X. C., Natl. Univ. of Singapore, Singapore; Ng, S. C.; Chan, H. S. O.; Li, S. F. Y.; Sensors and Actuators, B: Chemical; July 31, 1997; ISSN 0925-4005; Volume B42, no. 2, pp. 137-144; In English; Copyright; Avail: Issuing Activity

Six kinds of materials, i.e. three self-assembled monolayers with terminal functional groups, a polymer incorporating acid groups, and two supramolecules of calixarene derivatives were applied as QCM sensor coatings for selective detection of organic amines in liquid phases. The specific interactions such as acid-base interaction, complexation interaction between the coating materials and analytes make the coated QCMs sensitive to organic amines in aqueous phase. The characteristics of the coated QCM sensors varied with the detection media because of the changes of the physico-chemical properties of the coating surfaces. Reversible changes in resonance frequency of the coated QCMs were found in neutral water solution for acid-base interaction and hydrogen bonding; quasi-irreversible frequency changes were found for salt-complex forming reaction in buffer solution. The relative selectivity of the analytes decreased with the increase of the hydrophobic part of the solute molecules in aqueous phases when acid-base interaction between the coating materials and analytes were employed. Shape-discrimination of analytes were achieved by the usage of supramolecules as sensor coatings owing to the cavity inclusion of the supramolecules.

Author (EI)

Organic Liquids; Quartz Crystals; Chemical Reactions; Measuring Instruments; Amines; Piezoelectricity; Hydrogen Bonds; Chelation

19980044000

Chemical influences on the luminescence of ruthenium diimine complexes and its response to oxygen

Mills, A., Univ. of Wales, UK; Williams, F. C.; Thin Solid Films; August 28, 1997; ISSN 0040-6090; Volume 306, no. 1, pp. 163-170; In English; Copyright; Avail: Issuing Activity

Different luminescent, hydrophillic ruthenium diimine cationic complexes are rendered soluble in the hydrophobia medium of a plasticised polymer through ion-pair coupling with a hydrophobic anion, such as tetraphenyl borate. Based on this approach, a number of different oxygen sensitive films, i.e., luminescent, thin plastic films which respond to oxygen - the latter quenches the luminescence were prepared, using the polymer, cellulose acetate, plasticised with tributyl phosphate. of the resultant thin oxygen sensitive films tested, the one containing the luminescent ion-pair ruthenium (II) tris(4,7-diphenyl-l, 10-phenanthroline) ditetraphenyl borate. [Ru(dpp)(sub 3)(sup 2 +)(Ph(sub 4)B(sup -))(sub 2)], was found to be the most sensitive, and its response characteristics were subsequently studied as a function of plasticiser content, temperature and stability in use, and with age. The major response characteristics, i.e., film sensitivity towards oxygen and response and recovery times, depend very strongly upon the overall level of plasticiser present in film; the film is more sensitive and faster in response and recovery the greater the level of plasticiser employed. Thus, the response of the film towards oxygen can be tuned by varying the level of plasticiser in the film. Film sensitivity towards oxygen is largely independent on temperature, whereas its response and recovery times decrease with increasing temperature (E(sub a) = -10.3 +/- 0.4 kJ mol(sup -1)). The sensitivity of a typical luminescent film is very stable when used continuously over a 24-h period, decreases by ca. 20% with age when stored at ambient temperature over a period of 29 days, but very little over the same period of time when stored in the freezer section of a fridge.

Author (EI)

Gas Detectors; Oxygen; Chemical Reactions; Measuring Instruments; Luminescence; Ruthenium Compounds

19980044528

Measuring RF and microwave permittivities of adult rice weevils

Nelson, Stuart O., U.S. Dep. of Agriculture, USA; Bartley, Philip G. , Jr.; Lawrence, Kurt C.; IEEE Transactions on Instrumentation and Measurement; August, 1997; ISSN 0018-9456; Volume 46, no. 4, pp. 941-946; In English; Copyright; Avail: Issuing Activity

The dielectric permittivities of bulk samples of adult rice weevils were measured over the frequency range from 0.2 GHz to 20 GHz at temperatures from 10 C to 65 C with an open-ended coaxial-line probe, network analyzer, and a sample temperature control assembly designed for the measurements. Repeated measurements were highly variable, because mean sample bulk densities did not accurately reflect effective densities of the bulk rice weevil samples in the small volume of sample sensed by the coaxial-line probe. Density corrections based on earlier permittivity measurements on bulk rice weevil samples at 9.4 GHz, at known sample densities, removed much of the variability. The corrections utilized the linear relationship between the cube root of the dielectric constant and bulk density, which permitted estimates of the weevil body permittivities to be obtained with the Landau, Lifshitz, and Looyenga equation for dielectric mixtures. Estimated dielectric constants and loss factors of the insects from averages of seven different measurement sequences are presented graphically for temperatures from 15 C to 65 C.

Author (EI)

Radio Frequencies; Permittivity; Electric Networks; Temperature Effects; Microwaves; Resonant Frequencies

19980044835

Coagulation of fish proteins from frozen fish mince wash water by ohmic heating

Huang, Lihan, Oregon State Univ., USA; Chen, Ying; Morrissey, Michael T.; Journal of Food Process Engineering; September, 1997; ISSN 0145-8876; Volume 20, no. 4, pp. 285-300; In English; Copyright; Avail: Issuing Activity

A batch-type ohmic heating device was developed to investigate the possibility of coagulating fish proteins from frozen fish mince wash water. At constant voltage (90 VAC), the temperature of wash water samples was raised to different set points (40, 50, 60, 70, and 80 C, respectively). Effect of heating on coagulation of proteins and removal of COD, TS, and TSS was investigated. When the temperature reached 70 C, 33.0%, 59.3%, 33.3%, and 92.1% protein, COD, TS, and TSS, respectively, were removed from the wash water. Holding samples at constant temperatures for longer time periods did not improve solids removal, except at 40 C. The highest heating temperature for effective coagulation of proteins and removal of solids is 70 C. The relationship between heating temperature and heating time followed a second order polynomial model. Apparent electrical conductivity and energy consumption increased linearly with the heating temperature. At the early stage of heating, almost all electric energy was converted to heat energy. As the temperatures rose, energy efficiency began to decrease linearly with the temperature. Overall energy efficiency was above 86%.

Author (EI)

Water Heating; Proteins; Coagulation; Oxygen; Heat Treatment

19980045282 Chemical Industry Inst. of Toxicology, Research Triangle Park, NC USA

Pharmacokinetics of Methanol and Formate in Female Cynomolgus Monkeys Exposed to Methanol Vapors, *Apr. 1988 - Mar. 1991*

Medinsky, M. A., Chemical Industry Inst. of Toxicology, USA; Dorman, D. C., Chemical Industry Inst. of Toxicology, USA; Bond, J. A., Chemical Industry Inst. of Toxicology, USA; Moss, O. R., Chemical Industry Inst. of Toxicology, USA; Janszen, D. B., Chemical Industry Inst. of Toxicology, USA; 1997; 50p; In English

Report No.(s): PB98-126378; Copyright Waived; Avail: CASI; A03, Hardcopy; A01, Microfiche

The authors' objective was to determine the pharmacokinetics of C-14-methanol and C-14-formate in normal and folate-deficient monkeys after exposure to C-14-methanol vapors at environmentally relevant concentrations: below the Threshold Limit Value (TLV), at the TLV of 200 parts per million (ppm), and above the TLV. Four normal adult female cynomolgus monkeys were individually anesthetized with isoflurane, and each was exposed by endotracheal intubation to 10, 45, 200, or 900 ppm C-14-methanol for 2 hours. The amounts of exhaled C-14-methanol and (14)CO2, blood concentrations of C-14-methanol and C-14-formate, and C-14-methanol and C-14-formate excreted in urine were linearly related to methanol exposure concentration. For all exposures, blood concentrations of C-14-methanol-derived formate were 10 to 1000 times lower than endogenous blood formate concentrations (100 to 200 mM) reported for monkeys and were several orders of magnitude lower than levels of formate known to be toxic. Since the metabolism of formate in primates depends on the availability of tetrahydrofolate, the same four monkeys were next placed on a folate-deficient diet until folate concentrations in red blood cells consistent with moderate folate deficiency (29 to 107 ng/mL) were achieved. Monkeys were then reexposed to 900 ppm C-14-methanol for a similar 2-hour period. Even with a reduced folate status, monkeys exposed to 900 ppm methanol for 2 hours had a peak concentrations of methanol-derived formate that were well below the endogenous levels of formate. Although these results represent only a single exposure and therefore preclude broad generalizations, they do suggest the body contains sufficient folate stores to effectively detoxify small doses of methanol-derived formate from exogenous sources.

NTIS

Toxicology; Carbon Dioxide Concentration; Methyl Alcohol; Air Pollution; Pollution Monitoring

19980045662

Optical methods for tumor treatment and detection: Mechanisms and techniques in photodynamic therapy VI; Proceedings of the Conference, San Jose, CA, Feb. 8, 9, 1997

1997; In English

Report No.(s): SPIE-2972; ISBN 0-8194-2383-1; Copyright; Avail: AIAA Dispatch

Various papers on optical photodynamic therapy (PDT) methods for tumor treatment and detection are presented. Individual topics addressed include: PDT of the endometrium using ALA, PDT of supertentorial gliomas, PDT of dysplasia in Barrett's esophagus, light-emitting diode versus laser irradiation phototherapy with lutetium texaphyrin, preclinical studies of PDT of intracranial tissues, oxygen effect of PDT, enhancement of PDT due to hyperbaric hyperoxia, effect of fluence rate of cytotoxicity during PDT, modes of cytotoxicity associated with PDT, feasibility study of PDT light sources based on lasing action in strongly scattering media, and tumor detection in HpD-sensitized mice with fluorescence lifetime imaging. Also discussed are: measurement of the light dosimetry parameters in PDT, next-generation light delivery system for multitreatment extended-duration PDT, measurement of the triplet-state yield of photosensitizers in scattering media, hypericin-induced fluorescence in stomach cancer detection, and nonlinear decomposition and two-photon fluorescence of molecules in sensitized tissues.

AIAA

Conferences; Optical Measuring Instruments; Tumors; Treatment; Detection

19980045758 Interstate Commission on the Potomac River Basin, Rockville, MD USA

The 1997 Atlas of Chesapeake Bay Basin Biological and Living Resources Long Term Monitoring Programs

Ducnuigeen, J., Interstate Commission on the Potomac River Basin, USA; Jasinski, P. H., Interstate Commission on the Potomac River Basin, USA; Buchanan, C., Interstate Commission on the Potomac River Basin, USA; Dec. 1997; 220p; In English

Report No.(s): PB98-123243; No Copyright; Avail: CASI; A10, Hardcopy; A03, Microfiche

Tables of Contents: Bacteriological Monitoring; Phytoplankton Monitoring; Zooplankton Monitoring; Benthic Monitoring; Submerged Aquatic Vegetation Monitoring; Shellfish Monitoring; Fish Monitoring; and Bird Monitoring.

NTIS

Bacteriology; Ocean Bottom; Phytoplankton; Shellfish; Zooplankton; Research Projects

19980045851

Ophthalmic technologies VII; Proceedings of the Conference, San Jose, CA, Feb. 8, 9, 1997

1997; In English

Report No.(s): SPIE-2971; ISBN 0-8194-2382-3@ISSN 0277-7; Copyright; Avail: AIAA Dispatch

The present conference discusses ophthalmic diagnostics, laser interaction with ocular tissues, optics for ocular surgery, ocular implants, and eye-optics modeling. Attention is given to autofluorescence in ocular tissues, an invasive ocular microendoscope, data acquisition time constraints in elevation mapping of corneal topography, contact-compressive transscleral laser coagulation, hybrid retinal photocoagulation system, corneal modeling for analysis of photorefractive keratectomy, and an optomechanical eye model for lens photoablation observations.

AIAA

Conferences; Ophthalmology

19980045852

Medical imaging 1997 - Physiology and function from multidimensional images; Proceedings of the Conference, Newport Beach, CA, Feb. 23-25, 1997

1997; In English

Report No.(s): SPIE-3033; ISBN 0-8194-2444-7@ISSN 0277-7; Copyright; Avail: AIAA Dispatch

The present conference on the state of the art in the uses of multidimensional images to study physiological and brain structures and their functions discusses parrot vocalization in light of CT scans and image processing as well as mathematical models, a volumetric image-based comparison of male and female vocal tract shapes, the ex vivo validation of intrathoracic airway measurements, diagnostic possibilities for the use of multidimensional images, and the comparative analysis of renal flow using contrast power Doppler and gray-scale ultrasound. Also discussed are 3-D power Doppler angiography, the evaluation of intracranial aneurisms with CT angiography, quantification and visualization of the 3-D nonrigid motion of the left ventricle, a novel method for the kinematic analysis of joints, the localization of breast tumors using holographic interferometry, polyp detection with spiral CT colonography, and virtual endoscopy.

AIAA

Conferences; Physiology; Image Analysis

19980046359

Optical diagnostics of biological fluids and advanced techniques in analytical cytology; Proceedings of the Conference, San Jose, CA, Feb. 11-14, 1997

1997; In English

Report No.(s): SPIE-2982; ISBN 0-8194-2393-9; Copyright; Avail: AIAA Dispatch

Various papers on optical diagnostics of biological fluids and advanced techniques in analytical cytology are presented. The general topics addressed are: optical diagnostics of blood and blood components, structural and optical parameters in the assessment of biofluids, cell sorting, flow cytometry, light sources and detectors, time-based measurements, and analytical microscopy.

AIAA

Conferences; Diagnosis; Cytology; Body Fluids; Optical Measuring Instruments

19980046409

Action spectrum of oxidative reactions mediated by light-activated melanin

Glickman, Randolph D., Texas, Univ., San Antonio, USA; Rockwell, Benjamin A., USAF, Armstrong Lab., USA; Jacques, Steven L., Oregon Medical Laser Center, Portland; 1997, pp. 138-145; In English

Contract(s)/Grant(s): F49629-95-1-0332; Copyright; Avail: AIAA Dispatch

The melanin of the retinal pigment epithelial (RPE) cells is generally thought to have a photoprotective role in the eye, yet it is excited by light to a free radical which can react with cellular components. Soluble proteins extracted from the retina are photo-oxidized by the output of a xenon arc lamp containing UVA and visible wavelengths. The oxidative damage in this model consists of carbonyl adducts to the peptides, and is proportional to the amount of UVA present. Melanosomes isolated from bovine RPE cells and added to the retinal protein extract partly protect the proteins from photo-oxidation resulting from this broadband exposure. However, if the proteins are instead exposed to the 488 and 514.5 nm outputs of an argon CW laser, the amount of protein oxidation is markedly increased when melanosomes are present. This observation suggests that the melanin free radical is optimally excited by wavelengths in the blue-green region of the visible spectrum, and in fact the action spectrum for the photo-oxidation of NADPH by laser-excited melanin peaks between 450 and 500 nm. The present data do not distinguish between two alternative hypotheses, i.e., that the apparent action spectrum peak is due to (1) a chromophore different from the one determining

the overall optical absorption of melanin, or (2) the lower efficiency of UVA photons in activating melanosomes because of their strong absorption at the solution surface. Nevertheless, these data implicate melanin in the so-called 'blue light' retinal hazard.
Author (AIAA)
Melanin; Retina; Cells (Biology); Eye (Anatomy); Photooxidation; Continuous Wave Lasers

19980046410
Retinal spot size with wavelength
Rockwell, Benjamin A., USAF, Armstrong Lab., USA; Hammer, Daniel, USAF, Armstrong Lab., USA; Kennedy, Paul, USAF, Armstrong Lab., USA; Amnotte, Rodney, USAF, Armstrong Lab., USA; Eilert, Brent, USAF, Armstrong Lab., USA; Druessel, Jeffrey, USAF, Armstrong Lab., USA; Payne, Dale, USAF, Armstrong Lab., USA; Phillips, Shana, USAF, Armstrong Lab., USA; Stolarski, David, TASC, Inc., USA; Noojin, Gary, TASC, Inc., USA; 1997, pp. 148-154; In English; Copyright; Avail: AIAA Dispatch

We have made an indirect in vivo determination of spot size focusing in the rhesus monkey model. Measurements of the laser induced breakdown (LIB) threshold both in vitro and in vivo allow correlation and assignment of a spot size after focusing through the living eye. We discuss and analyze the results and show how trends in minimum visible lesion data should be assessed in light of chromatic aberration. National laser safety standards are based on minimal visual lesion (MVL) threshold studies in different animal models. The energy required for a retinal lesion depends upon many parameters including wavelength and retinal spot size. We attempt to explain trends in reported MVL threshold studies using a model of the eye which allows calculation of changes in retinal spot size due to chromatic aberration.
Author (AIAA)
Retina; Biological Models (Mathematics); Aberration; Eye Protection

19980046953
Flexible DSP-based network for real-time co-operative windowing applications
Nassif, S. C., McMaster Univ., Canada; Capson, D. W.; Real-Time Imaging; August, 1997; ISSN 1077-2014; Volume 3, no. 4, pp. 283-293; In English; Copyright; Avail: Issuing Activity

The architecture described in this paper is relevant to focus-of-attention applications such as visual tracking in which regions-of-interest (or windows) are used to reduce image data rates. It is particularly suited to robot guidance applications where high-speed image processing is required for real-time position control. The design is based on a 200 frames per second digital camera, programmable gate array technology, and a network of TMS320C40 digital signal processor modules. The system is configurable to allow acquisition and processing of selected windows within the camera's field-of-view, and the size and location of these regions are dynamically updated on a frame-by-frame basis, based on processing results such as the motion of a target. Using the high-speed communication ports of the DSPs, the windows may be made co-operative by exchanging information among processors to allow real-time adaptation to visual motion. The system is modular, independent of the host computer, and may be readily extended to include any number of windows. Several window placement and sizing strategies have been developed. A real-time motion tracking experiment that uses sum-of-squared differences and normalized cross-correlation techniques is described to demonstrate the system capabilities. Experimental results are included, together with a description of the architecture.
Author (EI)
Cross Correlation; Real Time Operation; Computer Vision; Positioning; Digital Techniques; Signal Processing; Cameras

19980047079
Laser-tissue interaction VIII; Proceedings of the Conference, San Jose, CA, Feb. 9-12, 1997
1997; In English
Report No.(s): SPIE-2975; ISBN 0-8194-2386-6@ISSN 0277-7; Copyright; Avail: AIAA Dispatch

Photocoagulation, therapeutic optics, diagnostic optics, and ocular effects are among the topics addressed in this conference on laser-tissue interaction. Attention is also given to photochemical, photothermal, and photomechanical effects, and to cavitation bubbles, ablation, and general laser-tissue interaction.
AIAA
Conferences; Tissues (Biology); Laser Target Interactions; Photochemical Reactions

19980047083

Ultrasensitive biochemical diagnostics II; Proceedings of the Conference, San Jose, CA, Feb. 10-12, 1997

1997; In English

Report No.(s): SPIE-2985; ISBN 0-8194-2396-3@ISSN 0277-7; Copyright; Avail: AIAA Dispatch

The papers contained in this volume provide an overview of recent advances in nucleic acid monitoring, manipulation, and sequencing technologies and in ultrasensitive clinical diagnostic systems. Specific topics discussed include wide-field imaging system design for a multiple-capillary DNA-sequencing system; biomedical applications of single molecule detection; error-budget considerations in diagnostic instrumentation; and high-sensitivity immunoassay using a novel upconverting phosphor reporter. Papers are also included on the monitoring of arterial oxygen saturation by laser-fiber technique; probing receptor-ligand interactions by sedimentation equilibrium; and automated hybridization and imaging for chemiluminescence-based multiplex sequencing.

AIAA

Conferences; Biochemistry; Diagnosis

19980047283

Visible lesion thresholds from near-infrared pico and nanosecond laser pulses in the primate eye

Cain, Clarence P., TASC, Inc., USA; Noojin, Gary D., TASC, Inc., USA; Caruthers, Val, TASC, Inc., USA; Toth, Cynthia A., Duke Univ. Eye Center, USA; DiCarlo, Cheryl D., Uniformed Services Univ. of Health Sciences, USA; Amnotte, Rodney, USAF, Armstrong Lab., USA; Rockwell, Benjamin A., USAF, Armstrong Lab., USA; 1997, pp. 133-137; In English; Copyright; Avail: AIAA Dispatch

Minimum visible lesions (MVL) are reported for picosecond and nanosecond laser pulses at near-IR wavelengths (1064 nm) in the primate eye, Macaca Mulatta. The 50 percent probability for damage (ED50) dosages are reported for 24 hour for both MVL and fluorescein angiography visible lesion (FAVL) thresholds at the 95 percent confidence level. The thresholds decreased by as much as 48 percent between the one-hour and 24-hour reading and were lower in all cases at 24 hours. MVL-(ED50) threshold doses were 19.1 micro-J at 7 ns and 4.2 micro-J and 4.6 micro-J at 80 ps and 20 ps respectively. Our thresholds measured for the near-IR laser pulses were lower by a factor of 4 to 8 than previously reported values but almost an order in magnitude higher that visible MVL thresholds for similar pulsewidth at visible wavelengths (580 or 532 nm).

Author (AIAA)

Ultrashort Pulsed Lasers; Eye (Anatomy); Picosecond Pulses; Near Infrared Radiation; Visible Spectrum

19980047284

Optical coherence tomography of the retinal response to ultrashort laser pulses

Toth, Cynthia A., Duke Univ., USA; Narayan, Drew G., Duke Univ., USA; Roach, W. P., USAF, Office of Scientific Research, USA; Birngruber, Reginald, Luebeck, Medizinisches Laserzentrum, Germany; Boppart, Stephen A., MIT, USA; Hee, Michael R., MIT, USA; Fujimoto, James G., MIT, USA; DiCarlo, Cheryl D., Uniformed Services Univ. of Health Sciences, USA; Cain, Clarence P., TASC, Inc., USA; Noojin, Gary D., TASC, Inc., USA; 1997, pp. 126-132; In English

Contract(s)/Grant(s): F49620-95-1-0266; F33615-92-C-0017; Copyright; Avail: AIAA Dispatch

An effort is made to assess the early in vivo evolution of tissue response and wound healing from ultrashort pulsed laser retinal lesions by correlating the cross sectional morphology from sequential optical coherence tomography with histopathologic sectioning. Single ultrashort laser pulses (20-40 micro-J, 580 nm 3 picosecond) were placed in the Macacca mulatta retina and evaluated by cross-section optical coherence tomography (OCT). These images were compared at selected time-points with corresponding histological sections. OCT was able to detect the acute tissue injury from laser delivery and the evolution of the healing response over eight days after laser delivery. These OCT images correlated well with histopathologic findings. Analysis of the extent of initial laser lesions and the type of healing response can be performed in serial sequence with OCT, providing new insight into the healing response from laser injury. This information correlates well with light microscopic data.

Author (AIAA)

Retina; Tomography; Coherent Light; Ultrashort Pulsed Lasers; Tissues (Biology); Wound Healing

19980047290

Functional imaging and optical manipulation of living cells; Proceedings of the Conference, San Jose, CA, Feb. 10, 11, 1997

1997; In English

Report No.(s): SPIE-2983; ISBN 0-8194-2394-7@ISSN 0277-7; Copyright; Avail: AIAA Dispatch

The present volume discusses topics in the fields of cellular imaging methods, laser-based imaging and manipulation, multimodality imaging, and biomedical and biotechnological applications of advanced imaging techniques. Attention is given to the

time-dynamic imaging of cell ligand-binding kinetics, laser trapping microscopy for the study of cellular response, chromophore-assisted laser inactivation of cellular proteins, two-photon single-particle tracking in 3-D, laser microbeam manipulation of cell morphogenesis, 3-D viewing with a compound microscope, multiuser facilities for microscopic imaging, and in vivo imaging of biological tissues using 1.3-micron optical coherence tomography.
AIAA
Conferences; Imaging Techniques; Optical Measuring Instruments; Cells (Biology)

19980048017
The hydrogen hypothesis for the first eukaryote
Martin, William, Braunschweig, Technische Univ., Germany; Mueller, Miklos, Rockefeller Univ., New York; Nature; Mar. 05, 1998; ISSN 0028-0836; Volume 392,, no. 6671, pp. 37-41; In English; Copyright; Avail: Aeroplus Dispatch

A new hypothesis for the origin of eukaryotic cells is proposed based on the comparative biochemistry of energy metobolism. Eukaryotes are suggested to have arisen through symbiotic association of an anaerobic, strictly hydrogen-dependent, strictly autotrophic archaebacterium (the host) with a eubacterium (the symbiont) that was able to respire but generated molecular hydrogen as a waste product of anaerobic heterotrophic metabolism. The host's dependence on molecular hydrogen produced by the symbiont is proposed as the selective principle that forged the common ancestor of eukaryotic cells.
Author (AIAA)
Hydrogen; Archaebacteria; Eukaryotes

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AEROSPACE MEDICINE

Includes physiological factors; biological effects of radiation; and effects of weightlessness on man and animals.

19980041386 Army Research Inst. of Environmental Medicine, Natick, MA USA
Effect of Menstrual Cycle Phase on Muscle Fatigue and Physical Performance During High Altitude Acclimatization *Final Report*
Rock, Paul B., Army Research Inst. of Environmental Medicine, USA; Sep. 1997; 69p; In English
Report No.(s): AD-A335874; No Copyright; Avail: CASI; A04, Hardcopy; A01, Microfiche

To characterize skeletal muscle function in women during altitude exposure, 19 women (22+1 yr; mean+SE) with normal menstrual cycles were studied at sea level (SL, days 1, 5, and 9 of the follicular and luteal phases) and after 1, 5 and 9 days of continued exposure to 4300 m (days 2, 6 and 9-10 of the follicular or luteal phase). Maximal voltintary contraction force was measured before ('strength') and every min during intermittent static contraction exercise (50% of strength, 5 sec contraction/5 sec rest) of the adductor pollicis muscle and every 2 min during dynamic contraction exercise (18 + 2% of strength at a contraction rate of 1 Hz) of the quadriceps femoris muscle, to exhaustion. Major findings were: (1) strength and time to exhaustion did not vary significantly (P greater than 0.05) between menstrual phases or among days within each phase at SL or altitude, and (2) endurance time to exhaustion for women --- in sharp contrast to male historical controls --- was similar at altitude as at SL. (Men have a much greater reduction in endurance time). The gender difference in muscle endurance was independent of menstrual phase and remained despite men and women having identical levels of strength and exercising to exhaustion at a similar work rate
DTIC
Altitude Acclimatization; Menstruation; Cycles; Females; High Altitude Environments; Muscles; Rhythm (Biology); Musculoskeletal System

19980041388 Maryland Univ., Baltimore, MD USA
Effects of Endurance and Resistance Training on Cardiovascular Risk in Military Eligible Women *Annual Report, 25 Sep. 1996 - 24 Sep. 1997*
Gardner, Andrew W., Maryland Univ., USA; Poehlman, Eric T., Maryland Univ., USA; Oct. 1997; 38p; In English
Contract(s)/Grant(s): DAMD17-96-I-6299
Report No.(s): AD-A335851; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The overall hypothesis is that the decline in physical activity habits and resultant increase in body fat reduces exercise capacity and muscle mass in military women. These lifestyle changes worsen metabolic and cardiovascular risk factors. Therefore, continued involvement in resistance and endurance exercise programs which increases or preserves fat-free mass, as well as enhances physical activity will prevent functional declines in military-eligible women. Although exercise is frequently recommended to enhance overall fitness, it is unclear as to whether endurance or resistance exercise is more effective in attenuating functional and

cardiovascular declines in women. We will systematically compare the effects of endurance and resistance exercise on physical activity, cardiovascular fitness, and fat metabolism in military eligible women. to accomplish this objective military eligible women (18 to 35 yrs) will be randomized to a 6 month endurance training, resistance training or a control group. We will determine the effects of endurance training and resistance training on changes in: (1) free-living physical activity using doubly labeled water and indirect calorimetry; (2) body composition and body fat distribution using dual energy x-ray absorptiometry and computerized tomography, (3) in-vivo fat oxidation from (13C)palmitate; and (4) insulin sensitivity from euglycemic clamps. Our results will provide new information on the energetic and physiological effects of endurance and resistance training on energy metabolism, cardiovascular fitness, and fuel utilization in women. We anticipate that the results from this study will provide the scientific basis for the recommended use of either endurance or resistance exercise as therapeutic modalities to increase physical activity, preserve fat-free mass, and decrease cardiovascular risk in military-eligible women.
DTIC
Cardiovascular System; Physical Fitness; Physiological Effects; Human Body; Females; Therapy; Adipose Tissues

19980041399 National Inst. for Occupational Safety and Health, Div. of Biomedical and Behavioral Science, Cincinnati, OH USA
Plain Language about Shiftwork
Rosa, Roger R., National Inst. for Occupational Safety and Health, USA; Colligan, Michael J., National Inst. for Occupational Safety and Health, USA; Jul. 1997; 46p; In English
Report No.(s): PB98-125495; NIOSH-97-145; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche
This document gives basic facts about shiftwork and talks about ways to make shiftwork life easier. It is organized into six sections: Background information; How to examine work schedules; Health and safety effects of shiftwork; Improving shiftwork through the organization; Copies strategies for the individual; Recommended reading.
NTIS
Schedules; Health; Work Capacity

19980041413 Armstrong Lab., Wright-Patterson AFB, OH USA
The Effect of Menstrual Phase and Oral Contraceptives on Female Adaptation and Performance at High G ***Final Report, 22 Dec. 1995 - 31 Mar. 1997***
Chelette, Tamara, Armstrong Lab., USA; Mar. 1997; 40p; In English
Report No.(s): AD-A337400; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche
Females are now flying combat aircraft in the Air Force. Questions of gender differences regarding adaptation and performance in the high environment (9G) must be studied Scientifically. The Dynamic Environment Simulator, a three-axis centrifuge with closed-loop flight simulation, provides the laboratory to investigate the issues. Results. The eight women in this high-G performance study did not show cardiovascular adaptation to high whereas the eight men did. Both genders showed increased leg calf compliance indicating possible chronic vascular effects. No echocardiographic graphic evidence of heart damage was found The women demonstrated half the strength of the men, but displayed similar G tolerance and endurance. The women showed less oxygen desaturation of brain tissue than the men during high exposure. The women did not perform the simulated air-to-air combat sortie quite as well as the men, though there was no effect of menstrual cycle on their ability to complete the mission There was no effect of high exposure on the length or the female monthly cycle, regardless of oral contraceptive use. Conclusion. Women demonstrated acceptable tolerance to and performance during simulated high aerial combat, without menstrual effect, even in light of their reduced muscular strength and cardiovascular adaptation as compared to men.
DTIC
Flight Training; Females; Cardiovascular System; Menstruation; Adaptation; Brain; Flight Simulation

19980041456 Saint George's Hospital, Medical School, London, UK
Noninvasive Monitoring of Tissue Oxygenation and Redox Status in Humans ***Final Report***
Whipp, Brian J., Saint George's Hospital, UK; Jan. 16, 1997; 18p; In English
Contract(s)/Grant(s): F6170-89-W-0334
Report No.(s): AD-A337588; EOARD-SPC-95-4020; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche
This report results from a contract tasking St. George's Medical School to investigate a cluster of reliable noninvasive techniques for the tracking of improvements in oxygen delivery, oxygen availability and oxygen usage within and in the vicinity of sites of injury. The investigator evaluated a range of state-of-the-art commercially available techniques designed to monitor the status of tissue hemodynamics and energetics in humans, both within and upstream of selected locations, such as the limbs and

the brain. The techniques included near infrared spectroscopy and Doppler based ultrasound monitoring of regional blood velocities and flows.
DTIC
Infrared Spectroscopy; Hemodynamics; Oxygenation

19980041461 Army Research Inst. of Environmental Medicine, Natick, MA USA
Hypohydration and Thermoregulation in Cold Air
OBrien, Catherine, Army Research Inst. of Environmental Medicine, USA; Young, Andrew J., Army Research Inst. of Environmental Medicine, USA; Sawka, Michael N., Army Research Inst. of Environmental Medicine, USA; Jan. 1997; 5p; In English
Report No.(s): AD-A338074; No Copyright; Avail: CASI; A01, Hardcopy; A01, Microfiche

Hypohydration and thermoregulation in cold air. This study examined the effects of hypohydration on thermoregulation during cold exposure. In addition, the independent influences of hypohydration-associated hypertonicity and hypovolemia were investigated. Nine male volunteers were monitored for 30 min at 250C, then for 120 min at 70C, under three counterbalanced conditions: euhydration (Eu), hypertonic hypohydration (HH), and isotonic hypohydration (IH). H ypohydration was achieved 12 h before cold exposure by inducing sweating (HH) or by ingestion of flirosemide (IH).
DTIC
Exposure; Hydration; Hypovolemia; Isotonicity; Perspiration

19980041525 Army Research Inst. of Environmental Medicine, Natick, MA USA
A Miniswine Model of Heatstroke
Gaffin, Stephen L., Army Research Inst. of Environmental Medicine, USA; Gentile, Brian, Army Research Inst. of Environmental Medicine, USA; Koratich, Michael, Army Research Inst. of Environmental Medicine, USA; Leva, Natalie, Army Research Inst. of Environmental Medicine, USA; Hubbard, Roger, Army Research Inst. of Environmental Medicine, USA; Jan. 1997; 31p; In English
Contract(s)/Grant(s): DEAC05-96OR-22464
Report No.(s): AD-A337448; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

We developed a miniswine model of passive heatstroke, in part, to explain the variable hyper-, normo- and hypokalemia seen in heatstroke victims. After a baseline period (Tamb=26-270 C), anesthetized and instrumented miniswine (n=13, mass=44.6 kg) were ramped t9 41-430 C, 60% RH; 13 controls were treated identically, but Tre was maintained at 3800. Tre of the experimental miniswine rose nearly linearly to 454600 until death (approx. 4h). The response patterns of mean arterial pressure, heart rate, plasma K+, LPS, Ca++, inorganic phosphate, lactate and a variety of other clinical chemical and physiological variables were determined. An explanation for the variability of plasma k+ in heatstroke victims was proposed. This model may be useful in characterizing the multisystemic pathology of severe heat injury and be useful for assessing innovative therapeutic regimens.
DTIC
Clinical Medicine; Physiological Effects; Inorganic Compounds; Blood Pressure; Models; Heat Stroke

19980045191 Macro International, Inc., Calverton, MD USA
CD-ROM Technology to Increase Appropriate Self-Care and Preventive Behaviors Among Army and Navy Women *Annual Report*
Gold, Robert S., Macro International, Inc., USA; Oct. 1997; 100p; In English
Contract(s)/Grant(s): DAMD17-96-C-6091
Report No.(s): AD-A336846; No Copyright; Avail: CASI; A05, Hardcopy; A02, Microfiche

The purpose of this report is to report the results of the first year of a 4 years study to investigate and address enlisted Army and Navy women's needs for basic gynecological and reproductive health education in order to enhance military readiness and general well-being. In the first phase of the study, a needs assessment was begun in which the methods included: (1) a mail survey of knowledge, attitudes, and practices (KAP) from a random sample of enlisted Army and Navy women; and (2) focus groups with enlisted Army and Navy women. This first year focused on developing the instruments, beginning approval procedures, conducting the expert panel meeting, and formulating partnerships with co-investigators on Army and Navy installations. Based on the results of the needs assessment, a culturally sensitive, multimedia CD-ROM and accompanying materials will be developed with the help of an advisory panel of military health care providers and with periodic reviews by the target audience. This intervention will then be tested in Army and Navy medical clinics in conjunction with annual Pap test screening.
DTIC
Clinical Medicine; Females; Health; Medical Services

19980045192 Texas Univ. Health Science Center, Houston, TX USA

Combat Readiness: Hygiene Issues Related to Military Women ***Annual Report***

Czerwinski, Barbara S., Texas Univ. Health Science Center, USA; Oct. 1997; 43p; In English

Contract(s)/Grant(s): DAMD17-96-2-6024

Report No.(s): AD-A336847; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Military personnel need to be prepared for combat readiness at all times, as this is central to the mission of the USA Armed Forces. Combat readiness in military women creates a unique set of health care requirements; For adult females, feminine hygiene practices constitute health care practices based on physiological necessities for the management of elimination products, including urine, feces, and menstrual discharge. This study is designed to investigate and to make recommendations for female health practices carried out in combat and non-combat environments by military women. In order to determine the best procedure(s) for maintaining feminine hygiene in combat environments, it is necessary to explore past and current practices a nd to obtain the recommendations of health care professionals. Both quantitative and qualitative research methodologies will be used to explore feminine hygiene practices. Phase 1, the qualitative section, has been completed and being used to format Phase 2, the questionnaire.

DTIC

Hygiene; Females; Health; Combat; Physiology

19980045193 Lovelace Institutes, Albuquerque, NM USA

The Physiology of Acute Mountain Sickness in Women ***Annual Report***

Loeppky, Jack, Lovelace Institutes, USA; Oct. 1997; 34p; In English

Contract(s)/Grant(s): DAMD17-96-C-6127

Report No.(s): AD-A336848; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The purpose of these investigations is to determine whether symptoms of acute mountain sickness (AMS) are affected by mensural cycle phase and oral contraceptives in women and whether the severity of AMS differs from men. The experimental test procedures have been selected, tested and performed on 10 subjects. The experiments consist of 12 hours exposures to a simulated altitude of 16,000 ft. Measurements of global and regional (brain magnetic resonance imaging) fluid homeostasis, ventilation, cognitive and autonomic function are emphasized in relation to control measurements and AMS symptoms. Women are tested in luteal and follicular phases of the menstrual cycle, confirmed by progesterone levels, and while on contraceptives and compared with men. Early results (n=10) suggest that a constant urine volume and transcapillary albumin escape rate and a declining plasma volume at altitude are associated with a high tolerance to AMS.

DTIC

Altitude Simulation; Altitude Sickness; Autonomic Nervous System; Homeostasis; Imaging Techniques; Menstruation

19980045194 Research Triangle Inst., Research Triangle Park, NC USA

Health Status of Military Women in the Total Force ***Annual Report, 1 Oct. 1996 - 30 Sep. 1997***

Bray, Robert M., Research Triangle Inst., USA; Oct. 1997; 97p; In English

Contract(s)/Grant(s): DAMD17-96-2-6021

Report No.(s): AD-A336849; RTI-6728/01/AR97; No Copyright; Avail: CASI; A05, Hardcopy; A02, Microfiche

The study of Health Status of Military Women and Men in the Total Force will obtain comprehensive probability-based epidemiological data for women and men across all pay grades for active-duty Army, Air Force, and Guard/Reserve components. These data will be combined with comparable data from a Naval Health Research Center survey of active-duty Navy and Marine Corps personnel to form a comprehensive dataset for the Total Force. Principal study objectives are to (a) examine the health status of military women and men in six general areas: reproductive health, medical history and nutritional status, mental health, lifestyle factors, occupational/environmental risks and stressors, and use of health services; (b) examine the effects of military women's and men's physical health conditions or emotional problems on military work; (c) examine the impact of military service on the health status of military women and men; and (d) examine factors associated with health care utilization, satisfaction, and access to health services. This Annual Report discusses major activities of Year 1, including questionnaire development and pilot testing, sample design, and data collection planning. In addition, it notes research activities planned for Year 2.

DTIC

Emotional Factors; Epidemiology; Females; Health; Medical Services; Mental Health

19980045269 Analytic Sciences Corp., San Antonio, TX USA

An Examination of the Validity of the Equivalent Background Principle for Predicting Optical Radiation Flash Blindness Effects ***Final Report, Jun. - Sep. 1996***

Kosnik, William, Analytic Sciences Corp., USA; Kang, Robert, Analytic Sciences Corp., USA; Dec. 1997; 31p; In English

Contract(s)/Grant(s): F33615 -92-C-0017; AF Proj. 7757

Report No.(s): AD-A336461; AL/OE-TR-1997-0176; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

We reviewed the light adaptation literature in an attempt to reconcile conflicting reports about the validity of the equivalent background principle (EBP) as a means of characterizing the adaptive state of the retina. The flashblindness model of the AL/OEO Integrated Personnel Effects Model (ILPEM), effectively a dark adaptation function, relies on the EBP to relate the afterimage from an intense light exposure to a hypothetical 'background' of uniform luminance that fades with time. This relationship, if true, makes it convenient to estimate the recovery of visual sensitivity after optical radiation exposure. However, this review found that the data do not support the validity of the EBP, especially for photopic vision. A test of the ILPEM flashblindness model showed weakness in its predictive validity as well. Using the flashblindness model to quantitatively fit two sets of dark adaptation data, we found significant deviations between the predicted and actual recovery times to visual targets. An alternative model was found to be more accurate in predicting the results of the two data sets.

DTIC

Optical Properties; Radiation Dosage; Hazards; Exposure; Visual Discrimination

19980045278 Army Research Lab., Atlanta, GA USA

Cortical Oscillations in the Visual Cortex ***Final Report, Jan. 1995 - Dec. 1996***

Raglin, Adrienne, Army Research Lab., USA; Nov. 1997; 46p; In English

Contract(s)/Grant(s): DA Proj. 1L1-62618-AH-80

Report No.(s): AD-A336627; ARL-TR-1558; No Copyright; Avail: Issuing Activity (Defense Technical Information Center (DTIC)), Hardcopy, Microfiche

Computer vision deals with algorithms that allow machines to detect, segment, feature extract, and recognize objects in an image. There are numerous applications in medicine, manufacturing, and security for this technology. By studying the visual processes of biological systems, enhancements can be achieved in the development of computer vision algorithms. One biological function of interest involves the oscillatory pulses generated in the primary visual cortex engaged in stimulus-specific oscillatory responses. As a result of these experiments, it can be concluded that these tightly correlated, stimulus-induced oscillations may play a role in the recognition of images. Therefore, these cortical oscillations have been modeled to investigate their ability to segment objects in a visual field. This report briefly discusses the visual system and the internally stimulus-dependent oscillations that may lead to identification of images. Emphasis will be on the models that attempt to reproduce this biological phenomena, their computational and behavioral aspects, as well as simulation performance. Detail will be given to their computational and behavioral aspects since it is in these areas that possible improvements can be achieved through more detailed modeling.

DTIC

Oscillations; Visual Fields; Computer Vision; Computer Programs; Neural Nets; Target Recognition

19980045304 Defence and Civil Inst. of Environmental Medicine, North York, Ontario Canada

Prediction of body Cooling

Tikuisis, P., Defence and Civil Inst. of Environmental Medicine, Canada; Belyavin, A. J., Defence and Civil Inst. of Environmental Medicine, Canada; Buxton, A. C., Defence and Civil Inst. of Environmental Medicine, Canada; Coleshaw, S. R., Defence and Civil Inst. of Environmental Medicine, Canada; Higgenbottam, C., Defence and Civil Inst. of Environmental Medicine, Canada; Aug. 1997; 18p; In English

Report No.(s): AD-A337424; DCIEM-97-TM-47; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The prediction of survival time for cold water immersion is very difficult due to several uncertainties. Foremost is the lack of well-documented data; hence the reliance of extrapolative techniques from controlled exposures involving mild levels of hypothermia. A second obstacle is the wide variability of individual response to cold. The challenge of prediction is further exacerbated by the ambiguity in the definition of survival time. These concerns must be addressed to improve the safety and rescue of people in the offshore environment. An international workshop was held to investigate the role of survival prediction models with a special emphasis on terminology.

DTIC

Cooling; Human Body; Survival; Predictions; Safety; Mathematical Models

19980046549 Brown Univ., Dept. of Pathology, Providence, RI USA

Six Month Report on Tissue Cultured Avian Skeletal Myofibers in the STL/A Module Aboard STS-77

Vandenburgh, Herman H., Brown Univ., USA; Feb. 07, 1997; 22p; In English

Contract(s)/Grant(s): NAS2-914

Report No.(s): NASA/CR-1998-207753; NAS 1.26:207753; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Space travel is know to effect skeletal muscle, causing rapid and pronounced atrophy in humans and animals, even when strenuous exercise is used as a countermeasure. The cellular and molecular bases of this atrophy are unknown. Space travel may cause muscle atrophy by a direct effect on the muscle fibers and/or indirectly by reducing circulating levels of growth factors such as growth hormone. The recent development of a tissue culture incubator system for Shuttle Middeck basic science experiments [Space Tissue Loss (STL) Module] by the Walter Reed Army Institute of Research (WRAIR) allows the study of the effects of space travel directly on isolated skeletal myofibers. Avian bioartificial skeletal muscle 'organoids' containing differentiated skeletal myofibers and connective tissue fibroblasts were flown aboard the Space Shuttle (Space Transportation System, STS) on Flight STS-77, a repeat of a similar experiment flown on STS-66. The results from these two flight experiments show for the first time that space travel has a direct effect on skeletal muscle cells separate from any systemic effects resulting from altered circulating growth factors.

Author

Human Performance; Human Reactions; Tissues (Biology); Musculoskeletal System; Space Flight Stress; Aerospace Medicine; Muscles; Fibroblasts; Atrophy

19980047375 Massachusetts General Hospital, Boston, MA USA

MRS and MRI Studies of the Structure and Function of Tumor Interstitial Matrix ***Annual Report, 3 Sep. 1996 - 2 Sep 1997***

Jain, Rakesh K., Massachusetts General Hospital, USA; Oct. 1997; 18p; In English

Contract(s)/Grant(s): DAMD17-96-1-6282

Report No.(s): AD-A336744; No Copyright; Avail: Issuing Activity (Defense Technical Information Center (DTIC)), Microfiche

The interstital matrix creates a barrier to therapeutic agent delivery. To overcome this barrier we must study the matrix characteristics and the effect of manipulations and therapy. We proposed to establish the use of magnetic resonance (MR) methods for studying tumor interstitium. We wished to: (1) determine by MR the collagen and glycosaminoglycan (GAG) concentration and diffusivity of small solutes in the interstitial matrix in breast cancer. (2) investigate the effect of antiestrogen therapy on the interstitial matrix composition in estrogen depen dent breast cancer. (3) study the effect of enzymatic modulation and biological response modifiers on the interstitial matrix. In pilot studies, Sodium MR was found to have insufficient resolution for determining GAG in tumor tissue. We developed a proton MR technique involving the contrast agent Gd-DTPA2- and showed that compared with sodium methods it was equally sensitive, and provided far higher spatial resolution. The latter allowed us to observe matrix accumulation in polymer scaffolds seeded with cells. We observed that the high cellularity of tumors affected the estimate of GAG content from the MR measurement. Subsequent theoretical analyses established a framework accounting for cellularity. We began to characterize diffusion imaging and its dependence on hydration in extracellular matrices.

DTIC

Biological Effects; Cancer; Collagens; Deformation; Diffusion; Diffusivity; Enzyme Activity; Estrogens; Neoplasms

53
BEHAVIORAL SCIENCES

Includes psychological factors; individual and group behavior; crew training and evaluation; and psychiatric research.

19980041380 University of Southern California, Behavioral Technology Labs., Redondo Beach, CA USA

Development of Scenario Tutors in a Generalized Authoring Environment: Feasibility Study ***Final Report***

Towne, Douglas M., University of Southern California, USA; Jan. 1998; 45p; In English

Contract(s)/Grant(s): N00014-97-I-0739

Report No.(s): AD-A335494; TR-119; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

An analysis of a representative set of scenario domains indicates considerable congruence of the entities, goals, and functions involved, suggesting the feasibility of producing a generalized authoring environment capable of producing highly customized and do main-specific training systems. Such an environment would only be effective if a training system developer can easily assemble the domain-specific appearance and behavior of the entities in a particular application. A provisional design of a general-

ized authoring environment specifies the content and information required of the author and the built in instructional elements that operate upon the domain representation.
DTIC
Assembling; Domains

19980041381 Massachusetts Inst. of Tech., Research Labs. of Electronics, Cambridge, MA USA
Training Spatial Knowledge Acquisition Using Virtual Environments ***Annual Report No. 1, 1 Feb. 1996 - 31 Jan. 1997***
Durlach, Nathaniel I., Massachusetts Inst. of Tech., USA; Jan. 20, 1998; 33p; In English
Contract(s)/Grant(s): N00014-96-I-0379
Report No.(s): AD-A335483; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche
The purpose of this study is to explore the potential benefits of using current Virtual Environments technology for training spatial orientation and navigation skills.
DTIC
Virtual Reality; Spatial Distribution; Navigation

19980041448 Southwest Research Inst., San Antonio, TX USA
Instructural Strategies for Reducing Stress and Improving Self-Efficacy and Job Performance of Female Naval Recruits ***Annual Report, 25 Sep. 1996 - 24 Sep. 1997***
Idar, Imelda S., Southwest Research Inst., USA; Oct. 11, 1997; 107p; In English
Contract(s)/Grant(s): DAMD17-96-2-6018
Report No.(s): AD-A337359; No Copyright; Avail: CASI; A06, Hardcopy; A02, Microfiche
With the advent of gender-neutral recruiting and the admission of females into more technical and non-traditional occupational fields, the Navy training experience with females has changed. The Navy believes that attrition in women is due to the fact that women are immersed in an environment dominated by men and that resulting stressors affect the women's ability to perform critical tasks, such as firefighting. The Navy believes that instructional interventions can improve women's job performance, decrease their stress, and improve their self-esteem. This purpose of this research effort is to determine the effectiveness of two instructional interventions on stress, self-efficacy, and job performance of female Navy recruits in firefighting training. The scope of the research project includes analyzing the training requirements, designing and developing the interventions and measurement instruments, collecting and evaluating data, and reporting the outcomes. This report presents a detailed summary of scientific issues and accomplishments for year one of the study, which include the analysis of the training requirements, preparation of the measurement instruments, development of the treatment plan, and design of the interventions. During years two and three, the instructional interventions will be developed and data will be collected, analyzed and reported.
DTIC
Education; Human Performance; Navy; User Requirements

19980041457 Helsinki Univ., Helsinki, Finland
Twentieth European Conference on Visual Perception, Volume 26, Supplement
Donner, Kristian, Helsinki Univ., Finland; Feb. 1998; 148p; In English, 24-29 Aug. 1997, Helsinki-Espoo, Finland
Report No.(s): AD-A337525; CSP-97-1023; No Copyright; Avail: CASI; A07, Hardcopy; A02, Microfiche
Topics covered at the twentieth Conference on Visual Perception (Abstracts of Papers) include: vision and brain dynamics; attention and performance; eye movements; color and form; hyperacuity; object recognition; depth and stereo; context patterns; computational theory; motion after effects and velocity.
DTIC
Visual Perception; Conferences; Eye Movements

19980041468 California Univ., Dept. of Information and Computer Science, Irvine, CA USA
A Combined Analytic and Inductive Approach to Learning in Knowledge-based Systems ***Final Report***
Pazzani, Michael J., California Univ., USA; Jan. 30, 1997; 8p; In English
Contract(s)/Grant(s): F49620-92-J-0430
Report No.(s): AD-A335735; AFRL-SR-BL-TR-98-0113; No Copyright; Avail: CASI; A02, Hardcopy; A01, Microfiche
A new analytic learning algorithm that dynamically evaluates the generality of learned concepts to maximize information gain has been developed.
DTIC
Knowledge Based Systems; Data Structures

19980041550 Human Resources Research Organization, Alexandria, VA USA

A Description of Multimedia Presentation of COBRAS Vignette Training Support Package Information ***Final Report, Jan. 1995 - May 1996***

Hoffman, R. G., Human Resources Research Organization, USA; Sep. 1997; 32p; In English

Contract(s)/Grant(s): DASW01-94-D-0011

Report No.(s): AD-A336703; HUMRRO-FR-WATSD-97-13; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The purpose of this paper is to describe a multimedia presentation of the background information needed to participate in a COBRAS vignette staff training exercise. Vignette exercises provide opportunities for brigade staffs to practice selected aspects of the planning and execution of heavy armored brigade missions. Because each exercise targets a different staff process, participants must become acquainted with the background scenario that provides the context for the activities they will practice. Training materials originally developed for the presentation of this background information were paper-based. to the detriment of the exercise, participants have had a tendency to avoid reading these materials. Multimedia may provide a more stimulating and efficient delivery method, but only if it is well designed. The outline of a multimedia presentation for one of the vignettes is developed using guidelines concerning the structure of the information being presented, sensory modalities suited to types of information, and principles of intrinsic motivation. The paper recommends testing the effectiveness of multimedia for delivering this type of training information.

DTIC

Multimedia; Physical Exercise; Snakes; Stimulation; Targets

19980043511

Approach to rock size measurement based on a model of the human visual system

Crida, R. C., Univ. of Cape Town, South Africa; de Jager, G.; Minerals Engineering; October, 1997; ISSN 0892-6875; Volume 10, no. 10, pp. 1085-1093; In English; Copyright; Avail: Issuing Activity

This paper describes research into the development of an instrument for the purpose of performing online measurement of rock size distributions using machine vision. Such an instrument would have application in the gold mining industry where it could be used to measure the fragmentation of gold ore on a conveyor belt feed to an autogenous mill, for the purpose of controlling the mill. A computation structure has been developed to identify and delineate rocks in an image for the purpose of measuring their areas. It is based on the human visual system in that it consists of a low-level preattentive vision stage and a higher-level stage of attention focusing. Multiscalar image processing techniques have also been integrated in order to improve the detection of rocks across a wide range of sizes. A performance advantage can be obtained in this way because all the algorithms can be better matched to the size of objects being detected.

Author (EI)

Rocks; On-Line Systems; Computer Vision; Image Processing; Grinding (Comminution)

19980045144 Army Construction Engineering Research Lab., Champaign, IL USA

Training Use Distribution Modeling

Guertin, Patrick J., Army Construction Engineering Research Lab., USA; Rewerts, Chris C., Army Construction Engineering Research Lab., USA; Dubois, Paul C., Army Construction Engineering Research Lab., USA; Mar. 1998; 6p; In English

Report No.(s): AD-A338052; CERL-TN-98/45; No Copyright; Avail: CASI; A02, Hardcopy; A01, Microfiche

This technical note provides an overview of the objectives, scope, and development of the maneuver impacts distribution model being developed as part of the Land Based Carrying Capacity (LBCC) effort. It includes a brief description of the development process, an example of its current functional status, and discussion of future efforts.

DTIC

Education; Mathematical Models; Armed Forces; Environment Effects

19980045267 Bayview Research, Shalimar, FL USA

Current State of Army Aviator Selection ***Final Report, Aug. 1996 - Feb. 1997***

Cross, Kenneth D., Bayview Research, USA; Aug. 1997; 83p; In English

Contract(s)/Grant(s): MDA903-93-C-0161

Report No.(s): AD-A336143; ASI/BR-105814-97-1; ARI-RN-97-22; No Copyright; Avail: CASI; A05, Hardcopy; A01, Microfiche

The current version of the Army's Flight Aptitude Selection Test (FAST) is aging and its predictive validity has declined substantially since it was first implemented. An analysis of existing records was performed to (a) determine the impact of the FAST's declining predictive validity on aviator trained eliminations and setbacks, and (b) estimate the benefits of increasing the FAST

cut-score from its present value of 90. The analysis focused on the eliminations and setbacks that occurred during the period between January 1, 1989, and December 31, 1995. Detailed data are presented on (a) the annual number and costs of eliminations and setbacks, (b) the causes of eliminations and setbacks, and (c) the estimated consequences of increasing the FAST cut-score. DTIC

Personnel Selection; Aircraft Pilots; Aptitude

54
MAN/SYSTEM TECHNOLOGY AND LIFE SUPPORT

Includes human engineering; biotechnology; and space suits and protective clothing. For related information see also 16 Space Transportation.

19980041297 Pennsylvania Univ., Dept. of Computer and Information Science, Philadelphia, PA USA

Efforts in Preparation for Jack Validation ***Final Report***

Azuola, Francisco, Pennsylvania Univ., USA; Badler, Norman L., Pennsylvania Univ., USA; Ho, Pei-Hwa, Pennsylvania Univ., USA; Huh, Sue-Jung, Pennsylvania Univ., USA; Kokkevis, Evangelos, Pennsylvania Univ., USA; Dec. 1997; 142p; In English

Contract(s)/Grant(s): DAMD17-94-J-4486; DA Proj. 1L1-62716-AH-70

Report No.(s): AD-A336464; ARL-CR-418; No Copyright; Avail: CASI; A07, Hardcopy; A02, Microfiche

This document presents a detailed record of the methodologies, assumptions, limitations, and references used in creating the human figure model in Jack, a program that displays and manipulates articulated geometric figures. This report reflects current efforts to develop and refine Jack software to enable its validation and verification as a tool for performing human engineering analysis. These efforts include human figure model improvements, statistical anthropometric data processing methods, enhanced human figure model construction and measuring methods, and automated accomodation analysis. This report discusses basic details of building human models, model anthropometry, scaling, Jack anthropometry-based human models, statistical data processing, figure generation tools, anthropometric errors, inverse dynamics, smooth skin implementation, guidelines used in estimating landmark locations on the model, and recommendations for validating and verifying the Jack human figure model. DTIC

Computer Programs; Data Processing; Display Devices; Human Factors Engineering; Statistical Analysis

19980041330 NSF International, Ann Arbor, MI USA

NSF Equipment Verification Test ing Plan. Bag Filters and Cartridge Filters

Apr. 21, 1997; 43p; In English

Report No.(s): AD-A337784; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

This document is the NSF Equipment Verification Testing Plan for evaluation of water treatment equipment utilizing bag filters or cartridge filters. This Testing Plan is to be used as a guide in the development of the Manufacturer Field Operations Document for testing bag filtration or cartridge filtration equipment, within the structure provided by the NSF Protocol Document, 'Protocol for Equipment Verification Testing for Physical Removal of Microbiological and Particulate Contaminants.' DTIC

Filters; Filtration; Protocol (Computers)

19980041536 National Inst. for Occupational Safety and Health, Washington, DC USA

Alternative Keyboards

1998; 16p; In English

Report No.(s): PB98-125503; NIOSH-97-148; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

This document provides basic information about common alternative keyboard designs and their effects on work posture. NTIS

Human Factors Engineering; Alternatives; Design Analysis; Posture; Computer Components

19980045270 Texas Univ., Dept. of Kinesiology and Health Education, Austin, TX USA

Effects of Work Rate and Temperature on Work/Rest Cycles When Wearing the Chemical Defense Ensemble ***Final Report, Aug. 1991 - Jan. 1995***

Wilmore, Jack H., Texas Univ., USA; Byrne, Heidi K., Texas Univ., USA; Mier, Connie M., Texas Univ., USA; Radcliff, Janice L., Texas Univ., USA; Nov. 1997; 163p; In English

Contract(s)/Grant(s): F33615-89-C-0603; AF Proj. 2729

Report No.(s): AD-A336660; AL/CF-TR-1997-0117; No Copyright; Avail: CASI; A08, Hardcopy; A02, Microfiche

Phase I was comprised of three study periods, Phase IB and Phase IC, where subjects walked on a treadmill at ambient temperatures of 70 degrees Farenheit, 80 degrees Farenheit, 90 degrees Farenheit, and 100 degrees Farenheit in an environmental chamber at two different rates of work, tilde 300 watts (3.0 mph, 0% grade) and tilde 450 watts (3.5 mph, 3.5% grade) while wearing a USAF Chemical Defense Ensemble. Subjects walked to a pre-determined core temperature cut-off point (first work cycle). At all temperatures other than 100 degree s Farenheit the subjects recovered in a semi-recumbent resting position to a pre-set core temperature and then completed a second work cycle to the same cut-off point. Subjects attempted to complete as many work cycles as possible in a six-hour period. For the 100 degree Farenheit trials, subjects completed only a single work cycle followed by a 20 minute recovery period. The most important finding from this series of studies was the tremendous individual variability in response to the imposed work rates, however the variability decreased with increasing ambient temperature. There were no variables that consistently predicted the total work time or the work time for the first work cycle. Thus, it is important to acknowledge individual differences in response to exercise while wearing the CDE, and to have military personnel experience working in the CDE under controlled, non-combat conditions where their individual responses can be noted for future reference in combat situations.

DTIC

Ambient Temperature; Chemical Defense; Physical Exercise; Physiological Responses; Warfare

19980045306 National Inst. for Occupational Safety and Health, Cincinnati, OH USA

Ergonomics: Effective Workplace Practices and Programs

1998; 584p; In English, 8-9 Jan. 1997, Chicago, IL, USA

Report No.(s): PB98-125701; No Copyright; Avail: CASI; A25, Hardcopy; A06, Microfiche

Table of Contents: Welcome Session; Plenary Session 1; Manufacturing 1; Construction; Apparel/Textile; Health Aspects of Successful Programs; Worksite Analysis; Resources and Where to Go For Help; Manufacturing 2; Maritime; Healthcare; Training; Product Design; Utilities; Report Back General Session No. 1; Plenary Session II; Office; Warehousing; Mining; Employee Involvement; Program Evaluation; Report Back General Session No. 2; Report Back General Session No. 3; Conference Adjournment

NTIS

Environments; Health; Conferences; Human Factors Engineering; Workstations; Safety Factors; Procedures

19980045591

Collision avoidance for automated inspection

Greenspan, Michael, National Research Council of Canada, Inst. for Information Technology, Ottawa, Canada; 1997, pp. 67-78; In English; Copyright; Avail: AIAA Dispatch

In certain automated inspection systems, computer controlled sensors are required to move arbitrarily close to the objects under inspection, whose geometries and positions may be unknown. There exists a potential for collisions which can cause damage to the sensor and the objects. A method based upon two representations is presented which ensures collision-free motions of the sensor and positioning apparatus. The sensed environment is modelled as a discrete volumetric grid called a voxel map, which is incrementally maintained as range data are acquired. The sensor and all moving attachments are modelled as sets of spheres. The method provides a conservative underestimate of the minimum distance between the surfaces of the sensor system and all workspace obstacles within a known error bound. The conditions are derived for which a continuous collision-free trajectory exists between two configurations. There are two operational modes where collision avoidance is useful. In direct teleoperation mode, the operator has joystick control over the position of the sensor, and potential collisions are detected and averted in realtime. In autonomous mode, the sensor path is planned automatically, and collision-free motions are generated by invoking the collision detection method within an enumerative search routine.

Author (AIAA)

Collision Avoidance; Automation; Inspection

19980047593

Breaking down the barriers

Everett, H. R.; Unmanned Vehicles; Apr. 1998; ISSN 1351-3478; Volume 3,, no. 1, pp. 18-20; In English; Copyright; Avail: Aeroplus Dispatch

Due to the increasing incidence of security breaches at industrial plants and the escalating costs of security/surveillance manpower and training, robotic systems for these applications are increasingly drawing attention. Accounts are presently given of the

designs and capabilities of the military Mobile Detection Assessment and Response System, and the commercially available Robarts I and III and Cyberguard SR2.
AIAA
Robot Dynamics; Obstacle Avoidance; Computer Vision; Prototypes

19980047715
Personalizing onboard route re-planning for recon, attack, and special operations missions
Bodenhorn, Chris, Lockheed Martin Federal Systems, USA; Galkowski, Peggy, Lockheed Martin Federal Systems, USA; Stiles, Peter, Lockheed Martin Federal Systems, USA; Szczerba, Robert J., Lockheed Martin Federal Systems, USA; Glickstein, Ira S., Lockheed Martin Federal Systems, USA; 1997; In English; Copyright; Avail: Aeroplus Dispatch

Over the past dozen years, first on independent R&D projects and most recently on the Rotorcraft Pilot's Associate Program (RPA), we have developed a powerful set of mission and route replanning functions designed to aid aviation operators in conducting recon, attack, and special operations missions. In order to support different mission types and operational units ranging from special operations to heavy attack, we have developed a set of personalization files that configure the planners at run-time. During part-mission assessments on the RPA program, we are tailoring these files to different mission types and pilot preferences. In addition, we are conducting evaluations of planner performance. Preliminary results indicate that high quality plans can be created by the computer, requiring little or no modification by pilots, in much less time than would be required by pilots acting alone.
Author (AIAA)
Military Aircraft; Cognition; Pilot Performance; In-Flight Monitoring; Combat; Flight Paths

19980047723
Assessing crew information requirements for advanced diagnostic and prognostic systems - Implications for interface and training design
Oser, Randall L., U.S. Navy, Naval Air Warfare Center, USA; Stout, Rene'e J., U.S. Navy, Naval Air Warfare Center, USA; Tyler, Robert, U.S. Navy, Naval Air Warfare Center, USA; 1997; In English; Copyright; Avail: Aeroplus Dispatch

Advanced diagnostic technologies that track and fuse sensor observables have been used to provide improved information for helicopter maintenance purposes. Because these systems can provide detailed information about emerging system anomalies, such systems have recently been considered for use during in-flight operations. The current paper: describes the concept of aircrew information requirements, discusses a methodology that can be used to structure and guide investigations of aircrew information requirements, presents results from a test of the methodology using operational aircrews, and outlines the implications of the methodology for future interface and training design.
Author (AIAA)
Aircraft Maintenance; Helicopters; Multisensor Fusion; In-Flight Monitoring; Flight Crews

19980047724
Assuring human-centeredness in intelligent rotorcraft cockpits - Using crew intent estimation to coordinate RPA functions
Andes, Robert C., Jr., Applied Systems Intelligence, Inc., USA; 1997; In English
Contract(s)/Grant(s): DAAJ02-93-C-0008; Copyright; Avail: Aeroplus Dispatch

The rationale and design for an intelligent Cockpit Intent Estimator (CIE) system for the Rotorcraft Pilot's Associate (RPA) is described. The CIE is an essential component of the RPA's crew-vehicle cockpit interface, known as the Cockpit Information Manager (CIM) function. Employment of the CIE in the associate allows the numerous, complex aiding functions of the RPA to remain 'lock-step' with the crew as the mission unfolds. CIE interpretation behavior, goal-processing activities, knowledge representation approach, and external communication mechanisms with other intelligent RPA subsystems are described with emphasis on CIE's essential role in the coordination of RPA functions to accurately follow the crew's lead and quickly regain coordination when the crew's intentions change. of particular interest is the RPA team's significant accomplishment in the area of combining prescriptive, automated task coordination with descriptive, intent understanding for producing intelligent associate behavior.
Author (AIAA)
Cockpits; Pilot Performance; Pilot Support Systems

19980047725
Task-based interface management - A Rotorcraft Pilot's Associate example
Miller, Christopher A., Honeywell Technology Center, USA; Funk, Harry B., Honeywell Technology Center, USA; Hannen, Matthew, Boeing Helicopter Systems, USA; 1997; In English
Contract(s)/Grant(s): DAAJ02-93-C-0008; Copyright; Avail: Aeroplus Dispatch

Interface management (IM) involves sifting through a potentially overwhelming variety of incoming data, presentation options, control modes, and automation behaviors in order to present what the human operator(s) of a system currently need in a manner that will be easily understood and manipulated by them. In this paper, we discuss our work on an IM system for the U.S. Army's Rotorcraft Pilot's Associate (RPA) - a highly complex, flight-worthy associate system. Interface management functions, performed within RPA by the Cockpit Information Manager (CIM) can be summarized by five basic behaviors: symbol selection, page selection, window placement, pan and zoom setting, and task allocation. We describe each of these behaviors briefly, using examples from a sample RPA mission scenario, and present data from initial implementation and pilot evaluation studies pertaining to pilot acceptance of these interface management behaviors.
Author (AIAA)
Pilot Support Systems; Pilot Performance; Cockpits; Information Management

19980047726
Demonstrated value of data fusion and situation assessment
Stiles, Peter, Lockheed Martin Federal Systems, USA; Hofmann, Martin, Lockheed Martin Advanced Technology Labs., USA; 1997; In English; Copyright; Avail: Aeroplus Dispatch

The Rotorcraft Pilot's Associate (RPA) team has made significant progress in many areas of cognitive decision aiding. This paper focuses on how we are demonstrating the value of data fusion and battlefield situation assessment. It provides an overview of the capabilities of RPA fusion and assessment. It discusses the methods by which we have obtained subjective and objective data and technical performance measures in pilot evaluations and engineering tests, and presents a summary of the results. Results from the first evaluation performed in the fall of 1996 show an average four-fold improvement in correct classification and vehicle count when using RPA compared to a simulated advanced baseline system without RPA.
Author (AIAA)
Multisensor Fusion; Combat; Pilot Support Systems; Pilot Performance

19980048308
Synthetic environment technologies in STOW 97
Turner, Jeffrey, U.S. Army, Topographic Engineering Center, USA; Koklauner, Karl, U.S. Army, Topographic Engineering Center, USA; 1997, pp. 466-472; In English; Copyright; Avail: Aeroplus Dispatch

The Synthetic Theater of War (STOW) is the major application of a Defense Advanced Research Projects Agency (DARPA) thrust in Advanced Distributed Simulation (ADS). The STOW Program focuses on an Advanced Concept Technology Demonstration (ACTD) termed STOW 97 sponsored by DARPA with the USA Atlantic Command (USACOM). The successful implementation of STOW 97 technologies in November 1997 with the United Endeavor 98-1 Exercise will mark the full operational capacity of the USACOM Joint Training, Analysis and Simulation Center. to support ADS applications up to the Joint Task Force level, STOW seeks to develop and demonstrate technologies enabling the integration of war-fighting through virtual and constructive simulations from geographically distributed locations in a common synthetic battlespace.
Author (AIAA)
Military Operations; Defense Program; Training Analysis; Systems Integration

55
SPACE BIOLOGY

Includes exobiology; planetary biology; and extraterrestrial life.

19980042668
Possible biofilms in ALH84001
McKay, David S., NASA Johnson Space Center, USA; Gibson, E. K., NASA Johnson Space Center, USA; Thomas-Keprta, K., NASA Johnson Space Center, USA; Romanek, C. S., NASA Johnson Space Center, USA; Allen, C. C., NASA Johnson Space Center, USA; 1997, pp. 919, 920; In English; Copyright; Avail: AIAA Dispatch

Several examples of thin structures or films found in the Martian meteorite ALH84001 are reported; etched carbonate globules display thin lacy films atop etched cleavage blocks. While complete identification of these features must await detailed chemical characterization, their striking similarity to known terrestrial biofilm structures must be acknowledged.
AIAA
Extraterrestrial Life; Mars Surface; Polymers; Thin Films; Meteorites

19980045670

Evidence relevant to the life on Mars debate. II - Amino acid results

Wright, I. P., Open Univ., UK; Grady, M. M., Open Univ., Milton Keynes; Natural History Museum, UK; Pillinger, C. T., Open Univ., UK; 1997, pp. 1587, 1588; In English; Copyright; Avail: AIAA Dispatch

The distribution of amino acids in EETA 79001 (E79) is considered on the basis of data cited by McDonald and Bada (1995). While the coarse grain size fraction of the sediment is mostly carbonate, the finer fractions are dominated by a terrigenous, noncarbonate mineral component. The overall concentration of aspartic acid is enriched in the carbonate-rich fraction of the sediment relative to the carbonate-poor, fine material. For E79 the ratio of aspartic acid concentrations in druse vs bulk is 12/1, which is significantly different from the case of the terrestrial sediment, but in the right sense (i.e., a carbonate-rich druse vs carbonate-poor bulk). The apparent enrichment in L-enantiomers can be explained in one of two ways: whether the amino acids are terrestrial contaminants, or the result of biological activity on Mars.

AIAA

Mars Environment; Extraterrestrial Life; Amino Acids; Proteins; Meteoritic Composition; Contamination

19980046221

Modeling the capture of cosmic dust particles in aerogel

Stratton, David, SETI Inst., USA; Szydlik, Paul, New York, State Univ., Plattsburgh; 1997, pp. 1389, 1390; In English; Copyright; Avail: AIAA Dispatch

Modeling of cosmic aerogel/particle impacts using a coupled thermodynamic and hydrodynamic (CTH) code is addressed. CTH is a flexible software system designed to treat a wide range of shock wave propagation and material motion phenomena. Although the CTH program allows two states of one material to be described by two equations of state, the elastic-plastic properties of a material are defined by one equation. Temperature in an aerogel and an impacting particle 20 micro-s after impact is shown. A glass coating was found to cover the front of the impactor after it was recovered from the aerogel.

AIAA

Cosmic Dust; Aerogels; Exobiology; Carbon; Carbon Compounds; Hydrodynamic Equations

19980046982

Thinking about life on Mars - Dangers and visions

Treiman, A. H., Lunar and Planetary Inst., USA; 1997, pp. 1447, 1448; In English; Copyright; Avail: AIAA Dispatch

It is dangerous to analogize and extrapolate from life on Earth to possible life in the poorly known environments of Mars. Our knowledge of Mars is basic; our knowledge of Earth life is growing; and nearly all past extrapolations to extraterrestrial life have been wrong. Inspired vision is needed to transcend the terrestrial paradigms and patterns of life, and conceive of biologies and ecologies that might have formed and evolved on Mars.

Author (AIAA)

Mars Environment; Extraterrestrial Life; Exobiology; Earth Environment; Biochemistry; Organisms

19980046989

Formation of magnetite and Fe-rich carbonates by thermophilic bacteria from deep terrestrial subsurface - A possible mechanism for biomineralization in ALH84001

Vali, H., McGill Univ., Canada; Zhang, C., Oak Ridge National Lab., USA; Sears, S. K., McGill Univ., Canada; Lin, S., Oak Ridge National Lab., USA; Phelps, T. J., Oak Ridge National Lab., USA; Cole, D., Oak Ridge National Lab., USA; Onstott, T. C., Princeton Univ., USA; Kirschvink, J. L., California Inst. of Technology, Pasadena; Williams-Jones, A. E., McGill Univ., Canada; McKay, D. S., NASA Johnson Space Center, USA; 1997, pp. 1473, 1474; In English; Copyright; Avail: AIAA Dispatch

Understanding the biogenic formation of magnetite and Fe-rich carbonate by thermophilic bacteria is essential to the search for ancient biological activities in hydrothermal systems on Earth and Mars. Laboratory experiments were conducted to study the formation of magnetite and Fe-rich carbonates by unknown anaerobic, thermophilic (45-75 C) bacteria. The bacteria were obtained from deep subsurface sedimentary basins in the USA. Using amorphous iron as an electron acceptor and glucose, acetate, or H2 as an electron donor, these bacteria produced magnetite in a wide range of pH and Eh conditions. The measured pH values ranged from 6.2 to 8.7; low pH values (less than 7.0) were found mostly in glucose-enriched cultures, whereas high pH values were found in H2/CO2-enriched cultures. Eh values decreased with increasing pH and ranged from -200 mV to -460 mV. In addition to magnetite, abundant siderite formed when pH was greater than 7.0 and CO2 concentration was greater than 5 percent of the incubation atmosphere.

Author (AIAA)

Terrestrial Planets; Carbonates; Bacteria; Exobiology; Magnetite; Planetary Surfaces

19980047038

What do fossil bacteria look like? Examples of 3.5 billion-year old mineral bacteria and the search for evidence of life in extraterrestrial rocks

Westall, F., Bologna, Univ., Italy; de Wit, M. J., Bologna, Univ., Italy; Dann, J., Bologna, Univ., Italy; 1997, pp. 1543, 1544; In English;

It is argued that terrestrial Early Archean fossils can be used as pointers to identify possible bacteria in extraterrestrial rocks. In the search for fossile bacteria in rocks from Mars, they might be similar to terrestrial bacteria, displaying similar sizes, shapes, and distributions. Given the fact that the original organic matter comprising the organism is not preserved as such, it is mineral fossils that should be searched for.

AIAA

Extraterrestrial Life; Rocks; Bacteria; Minerals; Fossils; Terrestrial Planets

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